The Fe and Pb-Zn skarn deposit at the Wondong Mine is located in the north-eastern part of the Taebaeksan Basin, which mostly comprises a large carbonate unit of Cambrian to Ordovician age. The Fe and Pb-Zn mineralizations at the Wondong Mine are genetically associated with Paleocene quartz porphyry and are characterized by abundant exoskarn with lesser endoskarn. The quartz porphyry contains a lot of phenocrysts of quartz and feldspars, which are partly altered to calcite and sericite and more abundant inward in the quartz porphyry. In exoskarn, we observed reddish brown garnet-rich zone, greenish garnet±pyroxene zone, and wollastonite-rich zone from the porphyry to the marble front. The paragenetic sequence of Fe and Pb-Zn skarn at the Wondong Mine comprises early calc-silicate alteration followed by mineralization. The Fe mineralization occurs at the contact of quartz porphyry and garnet skarn, whereas the Pb-Zn mineralization occurs as breccia-fillings and veins in quartz porphyry and garnet-rich skarn and also as massive mantos in the carbonate rock just beyond skarn. Temperature change accompanied by water-rock interaction is likely to be the major cause of metal precipitation in the Wondong skarn, resulting in the spatial separation of proximal Fe and distal Pb-Zn mineralizations. The skarn garnet at the Wondong Mine shows systematic changes in color and chemical composition. The garnets are grossular-andradite series and were reddish brown color and Al-rich (Gr61-74Ad23-36) in the proximal zone and greenish yellow and Fe-rich (Gr0-20Ad79-100) in the distal zone. Garnets are also characterized by being more Al-rich in the core of the crystal and more Fe-rich in rim. Pyroxene is exceptionally rare in the Wondong Mine, even though it is a major constituent in most skarn deposits. It, when found, occurs as large lath in the proximal magnetite ore and as replacement of garnet in garnet±pyroxene skarn and massive mantos. The composition of the pyroxene tends to vary from Mg-rich (Di92-98Hd1-6) in the magnetite ore to Fe-rich (Di42-85Hd11-47) in the distal locations. The ore minerals were mostly magnetite, galena, sphalerite, and pyrrhotite with lesser amounts of chalcopyrite, arsenopyrite, native bismuth, bismuthinite, and scheelite. Sphalerite shows systematic changes in color and composition as well. Varying Fe contents in the sphalerite, found distant from the source rock, may result in variation of color from light brown in veins to black in massive mantos. The composition of galena was constant regardless of the location of occurrence. Arsenopyrite tends to increase in As while to decrease in Fe and S with the increase of the distance from the source rock. These mineralogical zonation and chemical variations are believed to have been promoted by physio-chemical changes of hydrothermal fluids. These features may be helpful to understand the evolution of hydrothermal fluids responsible for calc-silicate alteration and Fe and Pb-Zn mineralization.